The TTEP Quarterly

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The quarterly update of U.S. EPA's Homeland Security Technology Testing & Evaluation Program (TTEP)

Welcome to TTEP

The U.S. Environmental Protection Agency (EPA) is actively participating in the national homeland security effort by ensuring the protection of the nation's drinking water systems and the safety of the public in buildings and other structures. EPA's Office of Research and Development's National Homeland Security Research Center (NHSRC) has established the Technology Testing and Evaluation Program (TTEP) to assist this effort.

TTEP is conducting third-party performance evaluations of commercially available homeland security technologies, incorporating stakeholder guidance and a high degree of quality assurance (QA) oversight. The users of information generated by TTEP are expected to include water utility operators, building and facility managers, emergency responders, health officials, regulators, the public, and the developers of homeland security technologies.

Evaluation of All Hazards Receipt Facility Screening Technologies

An ongoing TTEP evaluation related to detection technologies supports EPA's All Hazards Receipt Facility (AHRF) initiative. An AHRF is intended to receive samples collected from a site contaminated by a terrorist or another unknown event, and screen those samples for chemical, radiation, and explosives contamination in order to protect the safety of laboratory personnel who would subsequently analyze the samples. Approximately 20 screening technologies are being evaluated. Because of the need for rapid sample screening, most of those technologies are simple devices such as color indicator papers, test kits, or indicating tubes. However, three hand-held electronic devices, an ion mobility spectrometer, a flame spectrometer, and a photoionization detector, will also be evaluated. These technologies will be tested for detection of dangerous levels of toxic industrial chemicals (TICs) and chemical warfare agents (CWAs) in the vapor phase, in liquid samples, and on surfaces. The TICs are hydrogen cyanide, cyanogen chloride, arsine, phosgene, chlorine, hydrogen sulfide, fluoride, and hydrogen peroxide, and the CWAs are sarin (designated GB), sulfur mustard (HD), lewisite (L), and the nerve agent VX.

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Sample Collection for TTEP's Ultrafiltration Cartridge Evaluation

As part of the ongoing TTEP evaluation of ultrafiltration cartridges, 650 gallons of New York City finished drinking water were collected in May from a Bronx, NY site (shown in left two pictures) and shipped to Battelle in Columbus, OH (shown right). New York City water is not filtered during treatment, therefore making it a unique sample matrix for challenging these ultrafiltration cartridges. For information contact Dr. Alan Lindquist (lindquist.alan@epa.gov or 513-569-7192) or Ms. Patricia Holowecky (holoweckyp@battelle.org or 614-424-7885).

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Each candidate technology will be tested with each TIC and CWA it purports to detect and in each sample matrix for which the technology is applicable. Testing will assess the reliability of each technology for screening of clean samples under normal laboratory conditions, as well as the effects of potential interferences and temperature and relative humidity variations. Testing with vapor-phase TICs is nearly complete, and testing with both liquid and surface samples will begin in October. For more information, contact Mr. Eric Koglin (koglin.eric@epa.gov or 702-798-2332) or Dr. Tom Kelly (kellyt@battelle.org or 614-424-3495).

Persistence Testing of the Vaccinia Virus

An understanding of the persistence of biological agents, chemical agents, and toxic industrial chemicals on indoor building materials is important for protection of first responders from a deliberate or accidental release, properly planning approaches to decontaminate buildings, and correctly interpret efficacy data from use of decontamination technologies. To gather such data, TTEP, under the direction of EPA staff, is measuring persistence of chemicals, toxins, and living biological organisms on indoor building materials under various environmental conditions consistent with those that might be achieved using a heating, ventilation, and air conditioning (HVAC) system. The most recent work performed in this area measured the persistence of the vaccinia virus, a surrogate for *Variola major* (smallpox virus), on galvanized metal and painted concrete.

The persistence of viable vaccinia virus was measured after 3, 9, or 14 day exposure to ambient conditions (20°C, 40 - 70% relative humidity [RH]), high RH conditions (>70% relative humidity at 30°C), or low RH (<40% at 30°C). Persistence of the vaccinia virus was gauged by comparing the viable virus (plaque-forming units) extracted one hour after spiking the coupon of indoor building material to the amount of viable virus extracted from the same type of coupons over a more extended time.

Building Material	Humidity Level	Did viable virus remain?		
		After 3 days	After 9 days	After 14 days
Galvanized Metal	Low	yes	yes	yes
	Ambient	no	no	no
	High	no	no	no
Painted Concrete	Low	yes	yes	yes
	Ambient	yes	yes	yes
	High	yes	no	no

The results, summarized in the table above, indicate that the viable virus persisted on galvanized metal and painted concrete for up to 14 days under low RH conditions; but at the two higher RH conditions, the persistence of the virus depended on the type of material onto which it was applied. When applied onto galvanized metal, the virus persisted for less than three days under ambient and high RH conditions. When applied to painted concrete, the virus persisted for less than 9 days under the high RH and at least 14 days under ambient conditions. This is significant because, it had been thought that 24 hours would be the maximum persistence under such typical conditions. The results suggest that elevated percent RH may be useful for encouraging natural attenuation of vaccinia virus before and during the application of a decontamination technology.

Persistence testing has also been completed for ricin toxin, dimethyl methyl phosphonate (a surrogate for sarin), malathion (a surrogate for VX), and trinitrotoluene (TNT, a high explosive). A report describing these results in complete detail will be available later this year. For further information on TTEP persistence testing, contact Dr. Shawn Ryan (ryan.shawn@epa.gov or 919-541-0699) or Dr. Harry Stone (stoneh@battelle.org or 513-362-2602).

Attention TTEP Stakeholders

Both the TTEP Water Security and Decontamination Stakeholder com mittees will be convening in the near future. 1 ½ hour conference calls will be held this fall to brief you on the ongoing TTEP activities and one day, face-to-face meetings are being planned for 2007. Watch your email for an announcement. If you have questions, please contact Mr. Eric Koglin (koglin.eric@epa.gov or 702-798-2332) or Ms. Rachel Sell (sellr@battelle.org or 614-424-3579).